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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/067,917	02/08/2002	Hideyuki Nagaishi	NITT.0060	8672

7590 12/04/2003
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EXAMINER

GLENN, KIMBERLY E

ART UNIT	PAPER NUMBER
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2817

DATE MAILED: 12/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/067,917

Applicant(s)

NAGAIISHI ET AL.

Examiner

Kimberly E Glenn

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 17 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-6 8 10-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-4,8 and 10-12 is/are rejected.
- 7) ☒ Claim(s) 5 and 6 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 3, 4, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fathy et al US Patent 6,320,547 in view of Koriyama et al US Patent 6,188,368.

The primary reference, Fathy et al teaches a RF circuit parts are mounted on both sides of a multilayer dielectric substrate (502 506), and transmission lines (514) connecting said RF circuit parts (508 510 512) on both sides are constructed by a group of vias having a periodical structure or vias having a coaxial structure extended in the direction perpendicular to the face of said multilayer dielectric substrate. The via having the coaxial structure is formed by a center conductor 820 and a cylindrical conductor 822 surrounding said center conductor 820 and connected to a grounding conductive layer (814 808) provided in said multilayer dielectric substrate. A high frequency circuit part 508 provided on one of the faces of said multilayer dielectric substrate is an antenna. (Figures 5 7 and 8 and column 8 line 48 through column 11 line 61)

Thus, Fathy et al is shown to teach all the limitation of the claim with the exception of the group of vias having the periodical structure is constructed so that a plurality of vias are distributed around a center conductor at an interval which is equal to or smaller than 1/4 of wavelength of a signal of said transmission line.

Koriyama et al teaches the ground layer 3 being covered by the dielectric plate 5, which includes therein a plurality of via conductors 8 which are electrically connected to the ground layer 3 so as to surround the slot 4. The via conductors 8 produces a function for matching the impedance. The electromagnetic waves radiated from the slot 4 are radiated into the external space through the dielectric plate 5. Without such via conductors 8, the reflection of signals by the slot 4 can be suppressed to be not larger than, for example, -10 dB. However, the electromagnetic waves from the slot 4 are partly diffused in the dielectric plate 5 and propagate in the circumferential directions. By providing the via conductors 8 as shown in FIG. 3, the electromagnetic waves diffused in the dielectric plate 5 are shut off by the via conductors. The electromagnetic waves from the slot 4 are all radiated into the external space to further enhance the antenna characteristics. The gap among the plurality of via conductors 8 is not larger than one-fourth the wavelength of the high-frequency signals that are transmitted from the standpoint of producing a sufficient degree of effect for shielding the electromagnetic waves.

One skilled in the art at the time of the invention would have found it obvious to space the vias of Fathy at an interval which is equal to or smaller than $1/4$ of wavelength of a signal of said transmission line as taught by Koriyama et al. The motivation for this modification would have been to provide a sufficient degree of shielding of electromagnetic waves.

Claims 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sekine et al US Patent 6,249,242 in view of Fathy US Patent 6,320,547.

The primary reference, Sekine et al disclose a high-frequency transmitter-receiver apparatus includes a base plate 1 made of a metal and having a top surface on which an antenna substrate 2 formed of a dielectric for constituting an antenna is bonded and a bottom surface on

which a circuit substrate 3 formed of a dielectric for constituting a transmitter-receiver or transceiver circuit. Metal patterns 10 on the circuit substrate deposited on the surface of the circuit substrate 3 and metal patterns 7 on the antenna substrate deposited on the surface of the antenna substrate 2 are electrically connected to each other by a center conductor 6 of a coaxial line.

A circuit diagram showing a high-frequency (RF) circuit arrangement is shown in figure 16A. An RF (radio frequency) signal generated by an oscillator 127 is sent out from a transmitting antenna 121-1 through an RF amplifier 133 via a distributor 134. The RF echo received by a receiving antenna 121-2 is supplied to a mixer 123. Additionally, a part of the RF signal generated by the oscillator 127 is also supplied to the mixer 123 as a local oscillation signal via the distributor 134. Referring to FIG. 16B, the RF signal outputted from the oscillator 127 which is realized in the form of an MMIC semiconductor chip is supplied through a microstrip line 128 to an RF coaxial terminal 130-1 interconnecting the RF circuit and the transmitting antenna, while the signal received by the receiving antenna is applied to the mixer 123 implemented in the form of an MMIC semiconductor chip via an RF coaxial terminal 130-2.

Thus Sekine et al is shown to teach all the limitations of the claim with the exception of a group of vias including a periodical structure or via having a coaxial structure provided in the direction perpendicular to the faces of the dielectric substrates.

Fathy et al disclose coaxial transmission line 700 in figure 7A, a plurality of ceramic layers 702a-d are stacked on top of a metal pad 704. A conductive via is formed through ceramic layers 702a-d, defining an inner conductor 708 of coaxial transmission line 700. Inner conductor 708 extends through ceramic layers 702a-d to couple metal pad 704 to radiating element 706. A

plurality of outer conductive vias extends through ones of ceramic layers 702 as shown in figure 7B. This series of outer conductive vias are spaced apart from one another and distributed radially about inner conductor 708. The plurality of outer conductive vias defines a disjointed outer conductor 710 of coaxial transmission line 700. Outer conductor 710 and inner conductor 708 cooperate to provide direct EM coupling between metal pad 704 and radiating element 706.

Fathy et al also disclose shielded coaxial transmission lines in figure 8, the shield coaxial lines are defined by a coaxial inner conductor 820 in the form of a conductive via, and a hollow via which surrounds inner conductor 820. In each coaxial transmission line, a coaxial shield 822 is constructed around the hollow via and spaced apart from coaxial inner conductor 820 by virtue of the hollow via.

One of ordinary skill in the art would have found it obvious to replace the general coaxial transmission line of Sekine et al with the coaxial transmission line comprising a center conductor surround by plurality of vias or a coaxial shield as taught by Fathy et al since examiner takes notice of equivalence of the general coaxial transmission line and the coaxial transmission lines as taught by Fathy et al for their use in the communication art and the selection on any of these known equivalents to provide a transmission means would be within the level of ordinary skill in the art.

Claims 2, 3, 4, 8 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sekine et al US Patent 6,249,242 in view of Fathy et al US Patent 6,320,547 in view of Koriyama et al US Patent 6,188,368.

The primary reference, Sekine et al disclose a high-frequency transmitter-receiver apparatus includes a base plate 1 made of a metal and having a top surface on which an antenna

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substrate 2 formed of a dielectric for constituting an antenna is bonded and a bottom surface on which a circuit substrate 3 formed of a dielectric for constituting a transmitter-receiver or transceiver circuit. Metal patterns 10 on the circuit substrate deposited on the surface of the circuit substrate 3 and metal patterns 7 on the antenna substrate deposited on the surface of the antenna substrate 2 are electrically connected to each other by a center conductor 6 of a coaxial line. The transceiver circuit is hermetically sealed by means of a cover 5. The antenna substrate 2 and the circuit substrate 3 each have a ground conductor 21 and 31.

A circuit diagram showing a high-frequency (RF) circuit arrangement is shown in figure 16A. An RF (radio frequency) signal generated by an oscillator 127 is sent out from a transmitting antenna 121-1 through an RF amplifier 133 via a distributor 134. The RF echo received by a receiving antenna 121-2 is supplied to a mixer 123. Additionally, a part of the RF signal generated by the oscillator 127 is also supplied to the mixer 123 as a local oscillation signal via the distributor 134. Referring to FIG. 16B, the RF signal outputted from the oscillator 127 which is realized in the form of an MMIC semiconductor chip is supplied through a microstrip line 128 to an RF coaxial terminal 130-1 interconnecting the RF circuit and the transmitting antenna, while the signal received by the receiving antenna is applied to the mixer 123 implemented in the form of an MMIC semiconductor chip via an RF coaxial terminal 130-2.

Thus Sekine et al is shown to teach all the limitations of the claim with the exception of a group of vias including a periodical structure or via having a coaxial structure provided in the direction perpendicular to the faces of the dielectric substrates and the group of vias having the periodical structure is constructed so that a plurality of vias are distributed around a center

conductor at an interval which is equal to or smaller than $1/4$ of wavelength of a signal of said transmission line.

Fathy et al disclose coaxial transmission line 700 in figure 7A, a plurality of ceramic layers 702a-d are stacked on top of a metal pad 704. A conductive via is formed through ceramic layers 702a-d, defining an inner conductor 708 of coaxial transmission line 700. Inner conductor 708 extends through ceramic layers 702a-d to couple metal pad 704 to radiating element 706. A plurality of outer conductive vias extends through ones of ceramic layers 702 as shown in figure 7B. This series of outer conductive vias are spaced apart from one another and distributed radially about inner conductor 708. The plurality of outer conductive vias defines a disjointed outer conductor 710 of coaxial transmission line 700. Outer conductor 710 and inner conductor 708 cooperate to provide direct EM coupling between metal pad 704 and radiating element 706.

Fathy et al also disclose shielded coaxial transmission lines in figure 8, the shield coaxial lines are defined by a coaxial inner conductor 820 in the form of a conductive via, and a hollow via which surrounds inner conductor 820. In each coaxial transmission line, a coaxial shield 822 is constructed around the hollow via and spaced apart from coaxial inner conductor 820 by virtue of the hollow via.

One of ordinary skill in the art would have found it obvious to replace the general coaxial transmission line of Sekine et al with the coaxial transmission line comprising a center conductor surround by plurality of vias or a coaxial shield as taught by Fathy et al since examiner takes notice of equivalence of the general coaxial transmission line and the coaxial transmission lines as taught by Fathy et al for their use in the communication art and the selection on any of these

known equivalents to provide a transmission means would be within the level of ordinary skill in the art.

Koriyama et al teaches the ground layer 3 being covered by the dielectric plate 5, which includes therein a plurality of via conductors 8 which are electrically connected to the ground layer 3 so as to surround the slot 4. The via conductors 8 produces a function for matching the impedance. The electromagnetic waves radiated from the slot 4 are radiated into the external space through the dielectric plate 5. Without such via conductors 8, the reflection of signals by the slot 4 can be suppressed to be not larger than, for example, -10 dB. However, the electromagnetic waves from the slot 4 are partly diffused in the dielectric plate 5 and propagate in the circumferential directions. By providing the via conductors 8 as shown in FIG. 3, the electromagnetic waves diffused in the dielectric plate 5 are shut off by the via conductors. The electromagnetic waves from the slot 4 are all radiated into the external space to further enhance the antenna characteristics. The gap among the plurality of via conductors 8 is not larger than one-fourth the wavelength of the high-frequency signals that are transmitted from the standpoint of producing a sufficient degree of effect for shielding the electromagnetic waves.

One skilled in the art at the time of the invention would have found it obvious to space the vias of Fathy at an interval which is equal to or smaller than $1/4$ of wavelength of a signal of said transmission line as taught by Koriyama et al. The motivation for this modification would have been to provide a sufficient degree of shielding of electromagnetic waves.

Allowable Subject Matter

Claims 5 and 6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

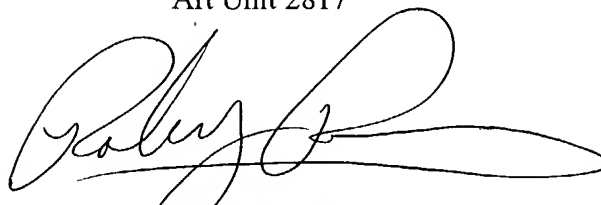
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimberly E Glenn whose telephone number is (703) 306-5942. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Pascal can be reached on (703) 308-4909. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7724 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Kimberly E Glenn
Examiner
Art Unit 2817

keg
November 25, 2003



Robert Pascal
Supervisory Patent Examiner
Technology Center 2800